# Substation monitoring BOOK

integrated


PowerView
Testing & Monitoring Equipment

YouTube



www.powerview-energy.com

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Testing & Monitoring Equipment

# About Power View

## Our mission

Power View Corporation Canada is a leading world class manufacturer of most advanced testing and monitoring solutions for the power industry. We are dedicated to developing innovative products and technologies to pioneer new HV testing and monitoring application.

The sensors and hardware used in our monitoring products are from most reputable manufacturers such as Agilent, National instruments, CTC, Flir and other specially developed sensors manufactured in Germany USA and Canada.

Our experienced development, technical , commercial and service department is committed to meeting each individual customer requirement at it's best.


## Our innovations

Innovative and reliable products are at the core of everything we do. We conduct innovative research, development, and manufacturing to high standards with ethics and integrity in everything we do

## Our Sustainability

Our vision and mission to deliver lasting value depend on our making decisions every day that support our long-term existence as a company worthy of public trust.

## Our Interactions

We put customers first. We are proud to serve our Customers and consider them in every decision we take. We strive to understand Customer's needs and act accordingly.

## Training Centers



## Service Centers

Quite significant aspect of the usage of testing and monitoring equipment (like cables fault location, transformer or generator monitoring equipment) is high demanding in terms of proper functionality 24/7.

With the components available today, the reliability of the equipment is very high, and it can be used for decades - but having local service is very important aspect of it. The reason behind this is that some equipment are too bulky and too important or complicated for deinstallation to be sent to service.

Due to high equipment fidelity and our customer satisfaction orientation - our local Service Center has managed to provide Repair Services completely free of charge for the past 20 years for everyone of our clients (for all the manufacturers we ever represented). Valuing our client's needs – we have always provided back up unit.

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# Complete substation Thermal & Corona Monitoring

integrated

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# Complete substation Thermal & Corona monitoring

Complete substation monitoring

Intelligent element recondition and reporting

The system is interconnected to visual inspection and regular thermal and corona inspection. All substation elements can be monitored such cable joint, knife contact, high voltage switchgear contact or copper platoon connection point, cable connectors, copper connections, switch contacts, reactors, capacitors, arc-suppression coil etc. insulators, VT's, CT's , power transformers , circuit breakers bushings , insulators etc.
When faults in these components happen - the temperature or corona change is detected instantly. The faults caused by overheating of electrical equipment or materials are mostly related to large current due to insulation failure, bad contacts pour craftmanship or material imperfection etc.

Our Complete process monitoring uses multiple thermal and corona UV cameras which are installed to cover a wider substation angle and distance up to 60 meters.

## BUILT-IN ANALYSIS & ALARM

## Description

The Power View Substation Thermal and Corona monitor monitors real-time temperature and corona values on each substation elements (covering cca. 400 sqm). The system has advanced software which recognizes each element type, so results are presented per individual elements AC temperature and corona values. Limits and alarms can be individually set for each individual element or by element type.

Each element is presented with a dot which turns color to orange or red depending on the temperature and corona levels.

This system is installed as turnkey solution for monitoring complete substation (all elements including power lines, insulators, circuit breakers, transformers, bushings etc.). The non-contact thermal and corona monitoring provides the most complete substation protection by early fault indication and outages prevention.

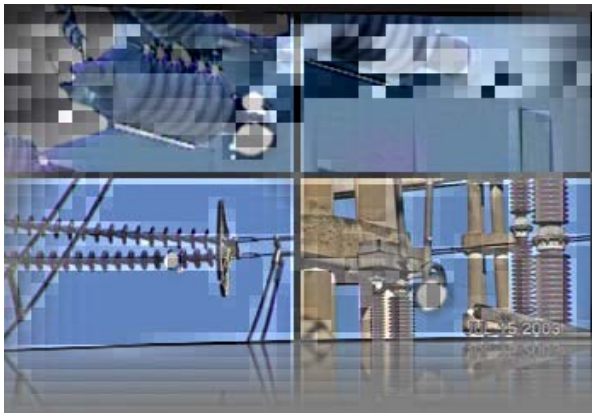
# Complete substation Thermal & Corona monitoring

## CORONA MONITORING

Corona is an electrical phenomenon that occurs the air around a conductor is ionized which causes an electric discharge. Corona is an important phenomenon to be monitored, because it can cause severe problems. Some of the problems that can be caused are:

- Power loss
- Noise
- Electromagnetic Interface
- Insulation and equipment damage

The corona discharge is manifested in ultrasound and UV Light. Our monitoring system uses UV light as least interference affected technology providing false alarm free full substation monitoring coverage. Modern software and acquisition system is used to process the measured data.



## TEMPERATUREE MONITORING

High temperature is one of the most common problem in the electrical industry. Higher temperature generally leads to fast material degradation which often causes insulation breakdown and losses This is the first system that Modern software and acquisition system is used to process the measure data. The technical specifications of the sensors are:

| | |
|---|---|
| Measurement Range: | 0-1000 deg c. |
| resolution | 0.1 deg C |
| Distance to spot | 50:1 |
| Accuracy | 0.1 deg C |
| Operating temp | -45 to +90 deg C |

| | |
|---|---|
| Operating Voltage | 24V |
| UV range | 180—250 nm |
| Sensitivity | 10pC / 10 m |
| Operating temperature | -40 to +125 deg C |
| | |

## Ordering information

| Ordering code | Description |
|---|---|
| 105-501 | Thermal and corona monitoring including Flir A310 320x284 UV and UHF sensors (1 configuration typically covers 150 – 200 sqr m substation area) |
| 105-502 | Thermal and corona monitoring including Flir Tau 640 640 x 320 plus UV and UHF sensors (1 configuration topically covers 150 – 200 sqr m substation area) |

integrated

# Substation Batteries Monitoring

# Battery monitoring

## Most accurate system

0.02 % of range + 0.05 % of reading

## Compact design

Very compact design, part of FC Stack Control System

## Introduction

The whole safety of the Power grid is closely dependent on substation battery reliability and optimal performance. Cell voltage and individual temperature monitoring is crucial for the battery lifetime and power network security.

## Modular cost-effective system

Reduced preventive maintenance costs and increasing safety. Extended batterie life by knowing the right time when a battery needs to be replaced.
Preventive maintenance or Maintenance of the equipment real condition is proven to be the most economical maintenance - in terms of service costs and investment management, capitalization and extension of the life of the equipment and the smallest losses in production (due to delays).

## Fully configurable and field upgradable

This online monitoring system is fully configurable onsite up-gradable. Users can start as voltage monitoring and continue with advanced individual cells temperature monitoring, ripple current and voltage monitoring and explosive gases monitoring.

## Cell Voltage monitoring

Generally, with the weakening of the capacity of a cell - the whole string of the battery loses its performance and the ability to deliver the necessary power. A bad cell turns from source to a consumer and damages other cells in the battery string (draws more current). POWERVIEW BVM system has highest accuracy on cell voltage measurement on the market , most advanced reporting and communication features. Software also includes most precise cell voltages monitoring and reporting according IEC during battery string deep discharge.

## Why perform battery monitoring?

- Increase the reliability of the system
- Prevent battery system failure /outages
- Prevent transformers and other HV equipment damage for improper protection relay / CB operation
- Increase battery lifetime and reduce waste -faulty cell will be replaced on time before it degrades the whole battery
- Reduce man hours while deep discharge testing - Cell voltage recording during deep discharge is included in the monitoring system and it works with all load unit manufacturers
- Improve safety and prevent explosions in battery rooms


*Fig.1 Cell voltage monitoring unit*



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# Battery monitoring

## Individual cell temp. monitoring

Individual cell temperature measurement eliminates premature cell aging and can regulate the battery charge voltage (within the given limit). If this is not regulated in time, the speed of chemical reactions in the cells increases and they are additionally heated. This is a catalytic process that results in cell sulfation and permanent damage. Part of the system are thermo-sensors that are installed on the negative electrode of all cells.

## Explosive gases monitoring

Cells degradation or failure results in extended Explosive gas generation in battery room. When hydrogen in generated to a higher level (when it is contained in 4% in the battery room air- it becomes explosive so the smallest spark can cause explosion. The BVM EX monitors this gas full to LEL limit and requires no maintenance and re-calibration in the whole lifetime.


## Charger ripple current monitoring

The effects caused by significant ripple are, over time, likely to cause the battery to deteriorate more quickly than if the DC float current is quiescent. The reversal of current much greater than the float current can cause heating, plate corrosion and 'walk-down' in state of health/state of charge, in addition to electrolyte stratification. It is therefore sensible to ensure the ripple current through the battery is as low as possible.


*Fig.2 Charger ripple current monitoring*

## Software features

Most precise Realtime cell monitoring and reporting
Cells + inter cell connection resistance
Most precise cell voltages monitoring and reporting according IEC during battery string deep discharge
Individual cell temperature and charger regulation
Electrolyte and explosive gases reporting

## Key advantages

- 24/7 notifications
- Historical trending
- Most advanced reporting and communication
- IP 69 protection
- Explosive gases detection to full LEL with no recalibration
- Modular system ( up to 400 cells monitored)
- Cost effective
- Greatest accuracy among battery monitoring systems 0.02 % of range + 0.05 % of reading
- Optional charger performance monitor

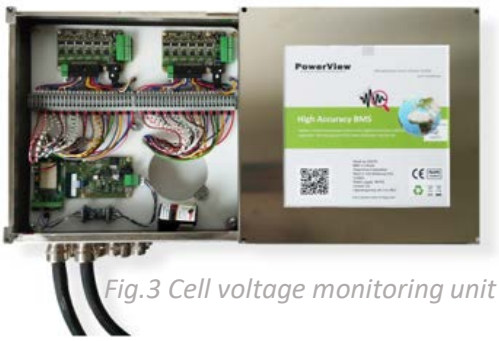



*Fig.3 Cell voltage monitoring unit*

## Technical Specification

| | |
|---|---|
| **Power supply** | 12- 24V V DC |
| **Dimensions** | 85 x 58 x 13.5 mm (without connector plugs) |
| **Dimensions** | Modular system 25x25 x 7 cm box |
| **Channel count** | Configurable and field upgradable system -up to 400 cells can be monitored with single monitoring system) |
| **Channel voltage ranges** | -5 ... +5 V or -50 to +50V |
| **Insulation** | 2 kV between channels and power supply + communication bus |
| | Additional isolation can be provided by isolating bus segments |
| **Sampling** | Precise 24-bit. All-channel sample rate up to 500 samples per second |
| **Accuracy** | 0.02 % of range + 0.05 % of reading |
| **IP protection** | IP 69 water and dust protection |
| **Ambient operating temperature** | -40 °C to +85 °C |
| | +85 °C to +125 °C module can be powered, measurement |
| | inactive |

| **Ordering code** | **Description** |
|---|---|
| **102-1342** | Cell Voltage monitoring 24 cells |
| **102-1623** | Cell Voltage monitoring 48 cells |
| **102-1626** | Cell Voltage monitoring 110 cells |
| **102-1629** | Cell Voltage monitoring 220 V |
| **102-1612** | Cell Voltage monitoring 400 cells |
| **102-1343** | Individual cell temperature monitoring |
| **102-1421** | Explosive gases monitoring |
| **102-1422** | Charger Ripple current monitoring |
| **Applicable Current** | 2.5 mA～5 A |
| **Max. Capable Current** | 5 A |
| **Nominal CT Ratio** | 4500:1 |
| **CT Inside Diameter** | ϕ22 mm |
| **Applicable Frequency** | 10Hz～5kHz |

# Surge arrester’s and Over-head lines leakage current monitoring and insulation analysis SLCM and OLCM

Detection & Monitoring

# Surge arrester's and Overhead lines leakage current monitoring and insulators analyzer SLCM

## Easy fault management

Less than 30 min installation, ultra-long-range wireless communication and the most advanced software integrated.

### Surge Arresters faults

Faults in Surge Arresters occur due to insulation degradation and imperfection, corona, aerosols and moisture. Although the surge arresters are cheap to replace, troubleshooting and finding faults in surge arresters is nearly important as the equipment they are protecting . Most of the surge arresters nowadays have counters which can help in some lifetime calculation, but the real condition of the Surge arrester is the one you have tested. The most common test of surge arrester is leakage current measuring (on the grounding point) with 3rd harmonics analysis. The SLCM does constant monitoring on leakage current and harmonics analysis with wireless communication and most advanced notifications and trending.

## Description

The POWER VIEW SLCM is permanently installed on a Surge arrester grounding conductor. Monitors and analyzes real time insulation leakage currents and harmonics under load conditions. This helps in early detection of all insulation problems. Using smart algorithm and additional sensors the interferences are eliminated for correct insulation analysis.

The monitoring system is available is available in several configurations and versions with IP protection classes starting from IP65. The power supply is Solar on a battery back up supply unit suitable for unattended 5 years operation with no maintenance and battery replacement.


## IEC60099-5 compliant

Measures leakage current on the Surge arrester grounding

## Ultra-long wireless communication and low power consumption

Wireless communication at ultra-long-range of several tenths of kilometers


## Easy fault management

The Surge arrester's leakage current monitor comes with powerful wireless software which integrates all substation elements. Users can view history and trending and be notified by individual alarms once fault is detected. All the alarms are fully configurable according Users needs.

## Mobile app

The software comes with a powerful Mobile app (Android IOS) for a complete substation analysis, monitoring and inspection.

# Technical specification

■ **Alarms, notifications and reporting**
Fully customizable alarms , email and SMS notification and trending

■ **Low ownership Smart substation integration**
Easy installation ( Clamp on box ) takes less than 30 minutes to completely integrate the system

■ **Advance Measurement Technology**

■ **Open circuit protection** and nonflammable material CT

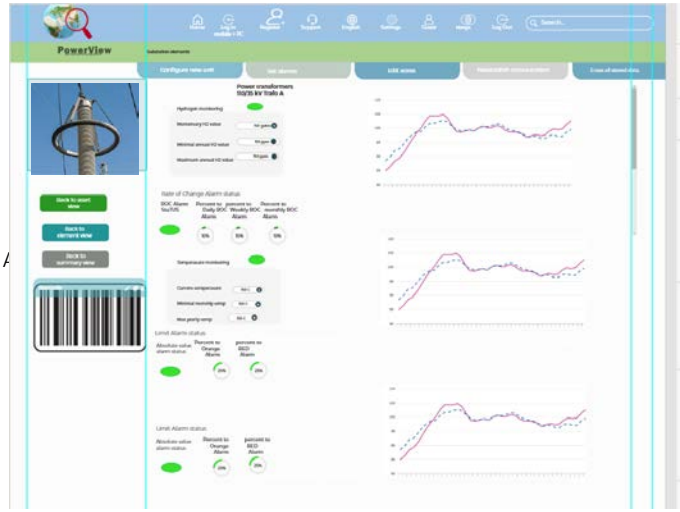
■ **Aluminum diecast enclosures** with more impact resistance then A enclosures

■ **Neoprene seal** to obtain IP-65 Protection class

■ **IP-65 protection class enclosures** protects from dust, liquid, impact and moisture which are needed for durability on outdoor conditions

■ **EMI shielded housing**

■ **Heavy duty outdoor**




| | |
|---|---|
| **Rated Primary Current** | **IAC5A（50/60Hz）** |
| **Applicable Current** | 2.5mA～5A |
| **Max. Capable Current** | 5A |
| **Nominal CT Ratio** | 4500:1 |
| **CT Inside Diameter** | ϕ22mm |
| **Applicable Frequency** | 10Hz～5kHz |

| | |
|---|---|
| **Rated Category** | **CAT IV 600V** |
| **Withstanding Voltage** | AC2200V/1 minute (between output terminal and CT) |
| **Insulation Resistance** | More than 100MΩ by 500V insulation tester (between output terminal and CT) |
| **Operation Temperature** | -25～60℃, less than 80%RH w/o condensation |
| **Dimension** | 57.5×66.3×22mm |
| **Standard** | Compliant with RoHS directive |
| **Accuracy** | 5% full range |
| **Power supply** | 5V battery DC solar option or 180-260V AC 50Hz |



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# Surge arrester's and Overhead lines leakage current monitoring and insulators analyzer SLCM

## Easy fault management

Less than 30 min installation, ultra-long-range wireless communication and the most advanced software integrated.

## Insulators faults

Faults in overhead lines happen due to insulators degradation and imperfection, corona, aerosols and moisture. Although the insulators are cheap to replace troubleshooting and finding the broken or damaged insulator in overhead lines can be tricky in some situations where fault is not indicated by really, fault is not visible, flashover happens at only high voltage and load can, not accessible terrain etc. The reason for insulators faults can be many such as pour craftmanship, physical damage during installation, overloading, material imperfection stress etc.
Overhead lines insulator's fault causes power supply downtime which sometimes results with penalties, production losses and additional network problems.

## Description

The POWER VIEW OLCM is permanently installed on an Overhead lines pole grounding system. Monitors and analyzes real time insulation leakage currents under load conditions. This helps in early detection of all insulator problems. Using smart algorithm and additional sensors the interferences are eliminated and true insulators analysis is achieved.

The monitoring system is available is available in several configurations and versions with IP protection classes starting from IP65. The power supply is Solar on a battery back up supply unit suitable for unattended 5 years operation with no battery replacement.

## Early fault detection and notification

Measures leakage current on the Overhead pole grounding point.

## Ultra-long wireless communication and low power consumption

Wireless communication at ultra-long-range of several tenths of kilometers


## Easy fault management

The Overhead Lines leakage current monitor comes with powerful wireless software which integrates all substation elements. Users can view history and trending and be notified by individual alarms once fault is detected. All the alarms are fully configurable according Users needs.

## Mobile app

The software comes with a powerful Mobile app (Android IOS) for a complete substation analysis, monitoring and inspection.



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# Technical specification

■ **Alarms, notifications and reporting**
Fully customizable alarms , email and SMS notification and trending

■ **Low ownership Smart substation integration**
Easy installation (takes less than 1 hour to completely integrate the system for 3 phase cable)

■ **Advance Measurement Technology**

■ **Open circuit protection** and nonflammable material CT

■ **Aluminum diecast enclosures** with more impact resistance then ABS enclosures

■ **Neoprene seal** to obtain IP-65 Protection class

■ **IP-65 protection class enclosures** protects your PCB from dust, liquid,
impact and moisture which are needed for durability on outdoor conditions

■ **EMI shielded housing**

■ **Heavy duty outdoor**

| | |
|---|---|
| **Rated Primary Current** | I AC 10 A（50/60Hz） |
| **Measurement Current range** | 1mA～10A |
| **Max. Capable Current** | 100A |
| **Nominal CT Ratio** | 4500:1 |
| **CT Inside Diameter** | Φ22mm |
| **Applicable Frequency** | 10Hz～5kHz |
| **Output Example** | AC19.1mV ± 5%（200mA/430Ω） |

| | |
|---|---|
| **Output Part** | Lead Wire： Approx. 4000mm （with Y Terminal: V1.25-B3A） |
| **Rated Category** | CAT IV 600V |
| **Withstanding Voltage** | AC2200V/1 minute (between output terminal and CT) |
| **Insulation Resistance** | More than 100MΩ by 500V insulation tester (between output terminal and CT) |
| **Operation Temperature** | -25～60℃, less than 80%RH w/o condensation |
| **Dimension** | 57.5×66.3×22mm |
| **Standard** | Compliant with RoHS directive |
| **Accuracy** | 5% full range |
| **Power supply** | 5V battery DC solar option or 180-260V AC 50Hz |

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## Distributor

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